

LTC 8016/90



Security Systems

EN | **Instruction Manual**
Allegiant Bilinx
Data Interface

BOSCH

Important Safeguards

1. **Read, Follow, and Retain Instructions** - All safety and operating instructions should be read and followed before operating the unit. Retain instructions for future reference.
2. **Heed Warnings** - Adhere to all warnings on the unit and in the operating instructions.
3. **Attachments** - Attachments not recommended by the product manufacturer should not be used, as they may cause hazards.
4. **Installation Cautions** - Do not place this unit on an unstable stand, tripod, bracket, or mount. The unit may fall, causing serious injury to a person and serious damage to the unit. Use only manufacturer-recommended accessories, or those sold with the product. Mount the unit per the manufacturer's instructions. Appliance and cart combination should be moved with care. Quick stops, excessive force, or uneven surfaces may cause the appliance and cart combination to overturn.
5. **Cleaning** - Unplug the unit from the outlet before cleaning. Follow any instructions provided with the unit. Generally, using a damp cloth for cleaning is sufficient. Do not use liquid cleaners or aerosol cleaners.
6. **Servicing** - Do not attempt to service this unit yourself. Opening or removing covers may expose you to dangerous voltage or other hazards. Refer all servicing to qualified service personnel.
7. **Damage Requiring Service** - Unplug the unit from the main AC power source and refer servicing to qualified service personnel under the following conditions:
 - When the power supply cord or plug is damaged.
 - If liquid has been spilled or an object has fallen into the unit.
 - If the unit has been exposed to water and/or inclement weather (rain, snow, etc.).
 - If the unit does not operate normally, when following the operating instructions. Adjust only those controls specified in the operating instructions. Improper adjustment of other controls may result in damage, and require extensive work by a qualified technician to restore the unit to normal operation.
 - If the unit has been dropped or the cabinet damaged.
 - If the unit exhibits a distinct change in performance, this indicates that service is needed.
8. **Replacement Parts** - When replacement parts are required, the service technician should use replacement parts specified by the manufacturer or that have the same characteristics as the original part. Unauthorized substitutions may result in fire, electrical shock or other hazards.
9. **Safety Check** - Upon completion of servicing or repairs to the unit, ask the service technician to perform safety checks to ensure proper operating condition.
10. **Power Sources** - Operate the unit only from the type of power source indicated on the label. If unsure of the type of power supply to use, contact your dealer or local power company.
 - For units intended to operate from battery power, refer to the operating instructions.
 - For units intended to operate **with External Power Supplies**, use only the recommended approved power supplies.
 - For units intended to operate with a limited power source, this power source must comply with EN60950. Substitutions may damage the unit or cause fire or shock.
 - For units intended to operate at 24VAC, normal input voltage is **24VAC**. Voltage applied to the unit's power input should not exceed 30VAC. User-supplied wiring, from the 24VAC supply to unit, must be in compliance with electrical codes (Class 2 power levels). Do not ground the 24VAC supply at the terminals or at the unit's power supply terminals.
11. **Coax Grounding** - If an outside cable system is connected to the unit, ensure that the cable system is grounded. U.S.A. models only - Section 810 of the National Electrical Code, ANSI/NFPA No.70, provides information regarding proper grounding of the mount and supporting structure, grounding of the coax to a discharge unit, size of grounding conductors, location of discharge unit, connection to grounding electrodes, and requirements for the grounding electrode.
12. **Grounding or Polarization** - This unit may be equipped with a polarized alternating current line plug (a plug with one blade wider than the other). This safety feature allows the plug to fit into the power outlet in only one way. If unable to insert the plug fully into the outlet, try reversing the plug. If the plug still fails to fit, contact an electrician to arrange replacement of the obsolete outlet. Do not defeat the safety purpose of the polarized plug. Alternately, this unit may be equipped with a 3-wire grounding plug (a plug with a third pin, for grounding). This safety feature allows the plug to fit into a grounding power outlet only. If unable to insert the plug into the outlet, contact an electrician to arrange replacement of the obsolete outlet. Do not defeat the safety purpose of the grounding plug.
13. **Lightning** - For added protection during a lightning storm, or when this unit is left unattended and unused for long periods of time, unplug the unit from the wall outlet and disconnect the cable system. This will prevent damage to the unit due to lightning and power line surges.

For Indoor Product

- Water and Moisture** - Do not use this unit near water - for example, in a wet basement, in an unprotected outdoor installation or in any area classified as a wet location.
- Object and Liquid Entry** - Never push objects of any kind into this unit through openings, as they may touch dangerous voltage points or short out parts that could result in a fire or electrical shock. Never spill liquid of any kind on the unit.
- Power Cord and Power Cord Protection** - For units intended to operate with 230VAC, 50Hz, the input and output power cord must comply with the latest versions of IEC Publication 227 or IEC Publication 245.
Power supply cords should be routed so they are not likely to be walked on or pinched. Pay particular attention to location of cords and plugs, convenience receptacles, and the point of exit from the appliance.
- Overloading** - Do not overload outlets and extension cords; this can result in a risk of fire or electrical shock.

For Outdoor Product

Power Lines - An outdoor system should not be located in the vicinity of overhead power lines, electric lights or power circuits, or where it may contact such power lines or circuits. When installing an outdoor system, extreme care should be taken to keep from touching power lines or circuits, as this contact might be fatal. U.S.A. models only - refer to the National Electrical Code Article 820 regarding installation of CATV systems.

For Rack-mount Product

- Ventilation** - This unit should not be placed in a built-in installation or rack, unless proper ventilation is provided, or the manufacturer's instructions have been adhered to. The equipment must not exceed its maximum operating temperature requirements.
- Mechanical Loading** - Mounting of the equipment in a rack shall be such that a hazardous condition is not achieved due to uneven mechanical loading.

Safety Precautions



CAUTION

RISK OF ELECTRIC SHOCK. DO NOT OPEN!



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK, DO NOT REMOVE COVER (OR BACK). NO USER SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.



This symbol indicates the presence of uninsulated "dangerous voltage" within the product's enclosure that can cause an electric shock.



This symbol indicates the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.



Installation should be performed by qualified service personnel only in accordance with the National Electrical Code or applicable local codes.



Power Disconnect. Units with or without ON-OFF switches have power supplied to the unit whenever the power cord is inserted into the power source; however, the unit is operational only when the ON-OFF switch is in the ON position. The power cord is the main power disconnect for all units.

FCC & ICES INFORMATION

(U.S.A. and Canadian Models Only)

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules and ICES-003 of Industry Canada. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and radiates radio frequency energy, and if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his expense.

Intentional or unintentional changes or modifications, not expressly approved by the party responsible for compliance, shall not be made. Any such changes or modifications could void the user's authority to operate the equipment. If necessary, the user should consult the dealer or an experienced radio/television technician for corrective action. The user may find the following booklet, prepared by the Federal Communications Commission, helpful: [How to Identify and Resolve Radio-TV Interference Problems](#). This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

WARNING: This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.

Sécurité

	ATTENTION RISQUE D'ÉLECTROCUTION. NE PAS OUVRIR!	
ATTENTION : POUR ÉVITER TOUT RISQUE D'ÉLECTROCUTION, N'ESSAYEZ PAS DE RETIRER LE CAPOT (OU LE PANNEAU ARRIÈRE). CET APPAREIL NE CONTIENT AUCUN COMPOSANT SUSCEPTIBLE D'ÊTRE RÉPARÉ PAR L'UTILISATEUR. CONFIEZ LA RÉPARATION DE L'APPAREIL À DU PERSONNEL QUALIFIÉ.		
	Ce symbole signale que le produit renferme une « tension potentiellement dangereuse » non isolée susceptible de provoquer une électrocution.	
	Ce symbole invite l'utilisateur à consulter les instructions d'utilisation et d'entretien (dépannage) reprises dans la documentation qui accompagne l'appareil.	
	Attention : l'installation doit exclusivement être réalisée par du personnel qualifié, conformément au code national d'électricité américain (NEC) ou au code d'électricité local en vigueur.	
	Coupe de l'alimentation. Qu'ils soient pourvus ou non d'un commutateur ON/OFF, tous les appareils reçoivent de l'énergie une fois le cordon branché sur la source d'alimentation. Toutefois, l'appareil ne fonctionne réellement que lorsque le commutateur est réglé sur ON. Le débranchement du cordon d'alimentation permet de couper l'alimentation des appareils.	

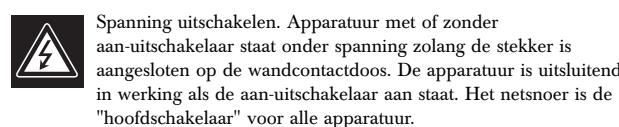
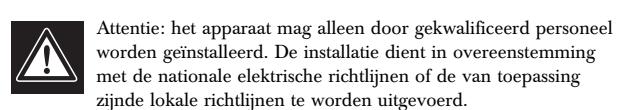
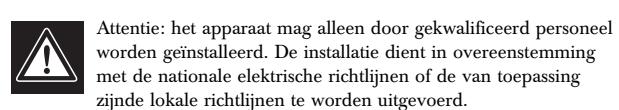
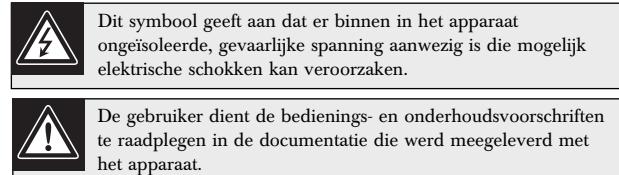
Sicherheitshinweise

	VORSICHT ELEKTRISCHE SPANNUNG. NICHT ÖFFNEN!	
VORSICHT: UM EINEN ELEKTRISCHEN SCHLAG ZU VERMEIDEN, IST DIE ABDECKUNG (ODER RÜCKSEITE) NICHT ZU ENTFERNEN. ES BEFINDEN SICH KEINE TEILE IN DIESEM BEREICH, DIE VOM BENUTZER GEWARTET WERDEN KÖNNEN. LASSEN SIE WARTUNGSSARBEITEN NUR VON QUALIFIZIERTEM WARTUNGSPERSONAL AUSFÜHREN.		
	Das Symbol macht auf nicht isolierte „gefährliche Spannung“ im Gehäuse aufmerksam. Dies kann zu einem elektrischen Schlag führen.	
	Der Benutzer sollte sich ausführlich über Anweisungen für die Bedienung und Instandhaltung (Wartung) in den begleitenden Unterlagen informieren.	
	Achtung! Die Installation sollte nur von qualifiziertem Kundendienstpersonal gemäß jeweils zutreffender Elektrovorschriften ausgeführt werden.	
	Unterbrechung des Netzanschlusses. Geräte mit oder ohne Netzschalter haben Spannung am Gerät anliegen, sobald der Netzstecker in die Steckdose gesteckt wird. Das Gerät ist jedoch nur betriebsbereit, wenn der Netzschalter (EIN/AUS) auf EIN steht. Wenn das Netzkabel aus der Steckdose gezogen wird, ist die Spannungszuführung zum Gerät vollkommen unterbrochen.	

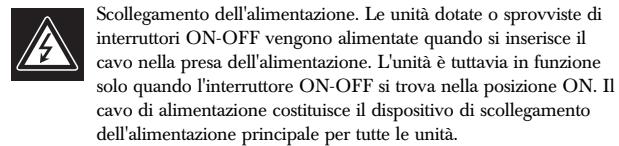
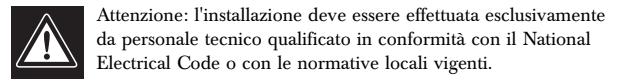
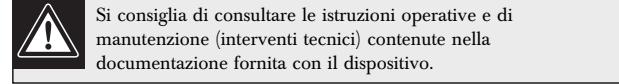
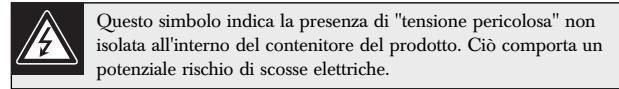
Precauciones de Seguridad

	ATTENZIONE PERICOLO DI SCOSSA ELETTRICA. NON APRIRE.	
PRECAUCIÓN: PARA DISMINUIR EL RIESGO DE DESCARGA ELÉCTRICA, NO RETIRE LA CUBIERTA (NI LA PARTE POSTERIOR). NO EXISTEN PIEZAS DE RECAMBIO EN EL INTERIOR DEL EQUIPO. EL PERSONAL DE SERVICIO CUALIFICADO SE ENCARGA DE REALIZAR LAS REPARACIONES.		
	Este símbolo indica que existen puntos de tensión peligrosos sin aislamiento dentro de la cubierta de la unidad. Estos puntos pueden constituir un riesgo de descarga eléctrica.	
	El usuario debe consultar las instrucciones de funcionamiento y mantenimiento (reparación) en la documentación que se suministra con el aparato.	
	Atención: la instalación la debe realizar únicamente personal cualificado de conformidad con el National Electric Code o las normas aplicables en su país.	
	Desconexión de la alimentación. Las unidades con o sin interruptores de encendido/apagado reciben alimentación eléctrica siempre que el cable de alimentación esté conectado a la fuente de alimentación. Sin embargo, la unidad sólo funciona cuando el interruptor está en la posición de encendido. El cable de alimentación es la principal fuente de desconexión de todas las unidades.	

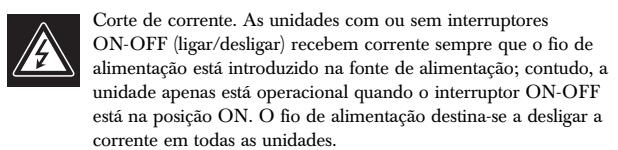
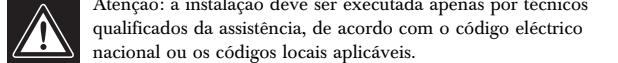
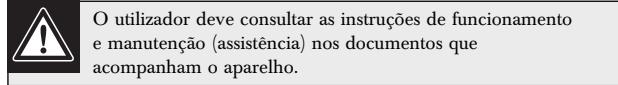
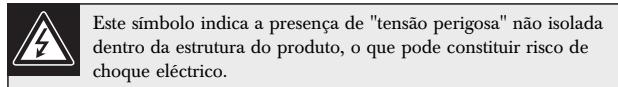
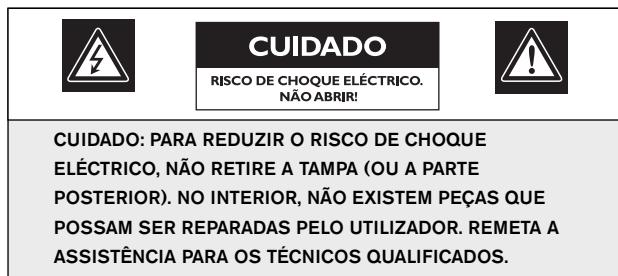
Veiligheidsmaatregelen



Sicurezza



Medidas de Segurança



安全预防措施

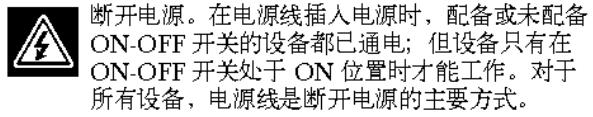
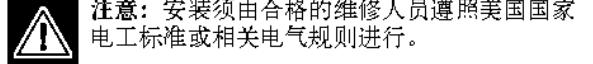
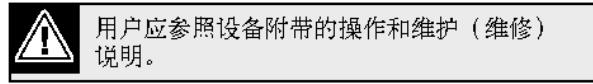
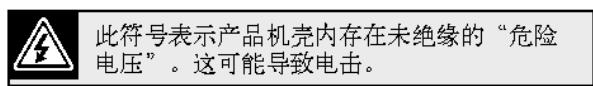


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1.0 UNPACKING

This equipment should be unpacked and handled with care. If an item appears to have been damaged in shipment, notify the shipper.

Verify that all parts shown in the *Parts List* have been included. If any items are missing, notify your Bosch Security Systems Sales or Customer Service Representative.

The original packing carton is the safest container in which to transport the unit. Save it for possible future use.

1.1 Parts List

Qty	Item
1	LTC 8016/90 16-channel data interface unit
2	AC power cords (one for 120 VAC, and one for 220 - 240 VAC)
1	2 m (6 ft) 16-Conductor video ribbon cable
1	3 m (10 ft) Data interface cable
1	6-Position terminal block with 100Ω terminating resistor
2	Rack-mount brackets
1	Offset screwdriver (star & slot ends)
1	This installation manual

2.0 SERVICE

If the unit needs repair, contact the nearest Bosch Security Systems Service Center for authorization to return and shipping instructions.

Service Centers

USA

Phone: 800-366-2283 or 717-735-6638
Fax: 800-366-1329 or 717-735-6639

CCTV Spare Parts

Phone: 800-894-5215 or 408-956-3853 or 3854
Fax: 408-957-3198
E-mail: BoschCCTVparts@ca.slr.com

Canada

Phone: 514-738-2434

Europe, Middle East & Asia Pacific Region

Phone: 32-1-440-0711

For additional information, see

www.boschsecurity.com.

3.0 DESCRIPTION

3.1 General

The LTC 8016 Allegiant Bilinx Data Interface Unit is an accessory device used to provide two-way communication between a controller and up to 16 Bilinx-capable cameras. Full control of pan/tilt/zoom functions and processing of camera alarm/events are supported. The Interface unit is especially suited for use with the Allegiant Series Matrix Switcher/Controllers.

When connected to a head-end device generating biphasic control code, single direction communication is available for control of pan/tilt/zoom, auxiliaries and pre-positions of Bilinx-compatible cameras.

Camera setup is simplified when the Interface Unit is used with the AutoDome Series of P/T/Z cameras, since programming of the dome camera address is no longer required. In addition to conventional CCTV coax, configuration solutions are available for other compatible video/data transmission products, such as unshielded twisted pair (UTP) products and fiber optic links.

3.2 Power

Model No.	Rated Voltage	Voltage Range	Nominal Power
LTC 8016/90	120 /230 VAC, 50/60 Hz	105 to 253	15 W

3.3 Compatibility Information

Although any device generating a standard video signal can be connected to the Allegiant Bilinx Data Interface Unit, it is only capable of **communicating** with devices that are compatible with Bilinx technology.

If the unit is being connected to any of the following devices, they must meet the following minimum specifications:

- Allegiant Series Switcher/Controller firmware 8.6 (released May, 2004) or later is required if using the Allegiant data interface connection.
- AutoDome Series Camera models with firmware 5.11 (released October, 2003) or later is required.
- Dinion Series Cameras that were manufactured after March 2004.

- Any **Dinion^{XF}** Series Cameras manufactured after April 2004.
- Any controller device generating **Allegiant** biphasic P/T/Z control code protocol.

4.0 INSTALLATION

The Allegiant Bilinx Data Interface Unit should be installed in a suitable indoor environment free from excessive dust, moisture and temperature extremes.

Setup of the Allegiant Bilinx Data Interface Unit is quick and easy. Follow the steps listed below. If a particular step does not apply to your configuration, proceed to the next step.

4.1 Enclosure Mounting and Location Selection

The Allegiant Bilinx Data Interface Unit is supplied in a desktop enclosure. If the unit is to be installed into a standard EIA 19-inch rack, remove the four (4) rubber footpads on the bottom. Use the supplied offset screwdriver to remove two (2) star head screws located on each side near the front of the unit. Then attach the supplied rack mounting brackets to the unit. The unit can then be installed into the rack with user-supplied fastening hardware.

Since video signal connections need to be made between the Interface Unit and the main system control unit, the physical distance between them should be taken into consideration. Connection between the LTC 8016 and the control device is via a 34-pin video ribbon cable. A 2 m (6 ft) video ribbon cable is supplied, but if the controller does not support this type of video connection, optional accessory products are required. If unsure of the available connection methods, refer to the *Section VIDEO CONNECTIONS TO CONTROLLER UNIT* found later in the manual.

4.2 Connections to AC Power

Connect the appropriate power cord to the AC main source. If the cord termination is not suitable for connection to the main AC supply, modification to the cord, or a locally sourced cord with the correct end style is required.

4.3 Camera Video Connections

There are two banks of BNC inputs on the rear panel of the Interface Unit: 1-8 and 9-16. The inputs are designed to accept standard composite video signals, and are fixed at 75Ω termination. The unit accepts NTSC or PAL video signals. Both Bilinx and non-Bilinx cameras can be connected to a bank of inputs, but at least one Bilinx camera must be connected to the bank in use, or it will enter a search mode and cause a periodic video disturbance. If more than 8 cameras are connected to the unit, both banks must have at least one Bilinx camera connected to it.

**BILINX TECHNOLOGY PROVIDES
ADJUSTMENT AND CONFIGURATION
CAPABILITIES FOR COMPATIBLE CAMERAS
FROM THE CONTROLLER LOCATION.
THERE'S NO NEED TO PRE-PROGRAM
CAMERA OPTIONS OR CONFIGURE
CAMERA ADDRESSES.**



Coax communication must not exceed 300 m (1000 ft) when using RG-59U grade CCTV coax, or 600 m (2000 ft) when using RG-6 or RG-11 grade coax.

There are other types of video transmission devices that are compatible with Bilinx technology. The LTC 4630 & LTC 4631 Series can transmit Bilinx video signals via fiber optics, up to a maximum of 600 m (2000 ft). It is also possible to use CAT-5 grade cable connected to Balun devices, to achieve distances of up to 225 m (750 ft).

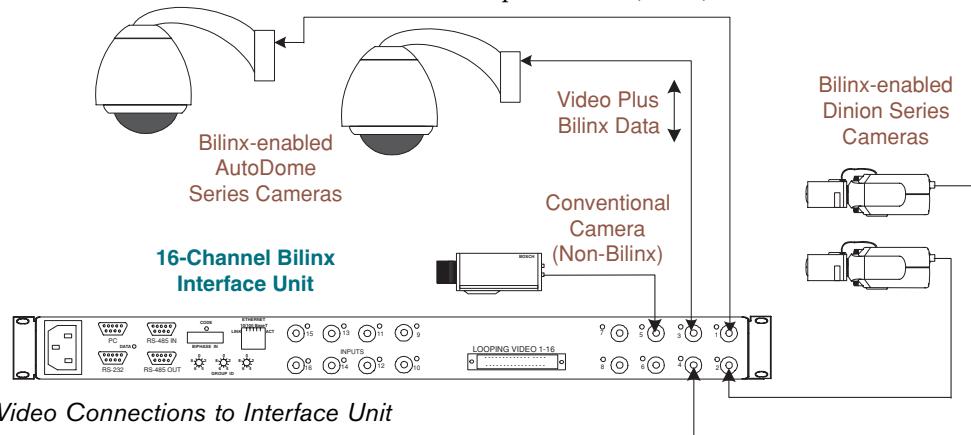


Figure 1 Typical Video Connections to Interface Unit

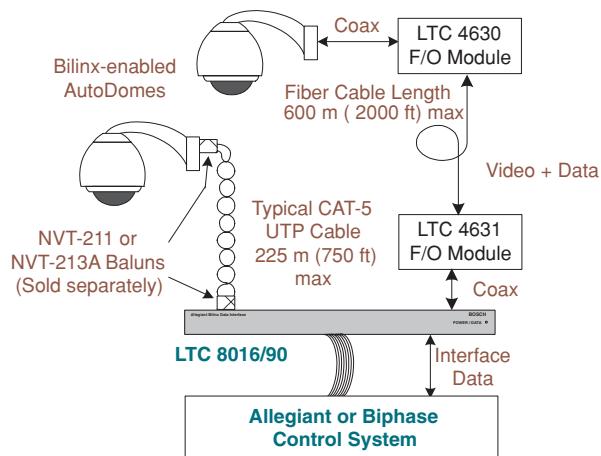


Figure 2 Interface Unit Used with Other Video Transmission Technologies



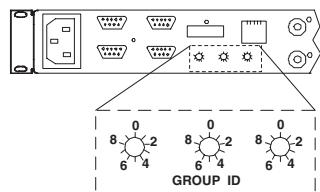
NOTE: The video signal and Bilinx control data require unobstructed two-way communication. Do not place **active** video devices in the coax line, because it will block the control data signals.

Passive devices, such as ground loop isolation transformers or other devices specifically designed to support Bilinx communication, can be placed in the coax line. In some configurations, it may be possible to connect an active device **after** the video passes through the head-end control unit. For sample applications, refer to the *Typical Configuration Diagrams Section* found later in this manual.

When an operating camera is connected to the Interface Unit, the video channel LED illuminates GREEN to indicate the presence of an acceptable video signal. As Bilinx control data is sent to or received from Bilinx-enabled cameras, the respective channel LED flashes accordingly.

4.4 Group ID Number

The rear panel of the Interface Unit contains a set of 3 rotary switches, as shown below. Use the straight slot side of the supplied offset screwdriver to set the switches to the necessary value.



These switches are used to identify the group of cameras to be connected to the Interface Unit. Each group consists of 16 cameras in consecutive order, and the group must always end at an exact multiple of 16. For example, the lowest camera group range is from 1 to 16. The next group range is from 17 to 32, etc., up to the last group (camera range of 9985 to 9999). If multiple Interface Units are used in the same system, each Group ID number must be unique.

The following chart summarizes the supported switch settings:

Switch Setting	Use
001 to 625	Valid switch settings used for Allegiant and biphase controller interfaces
901 to 931	Settings used in Allegiant interface mode to terminate RS-485 data line
000	Reserved; setting is used during firmware upgrades
900	Reserved; setting is used by the factory

When the Interface Unit is connected to an Allegiant system using the Allegiant data interface protocol, the Group ID switches should always be set to correspond to the **physical** camera numbers used in the system. For control systems that use the biphase data interface, the switches should be set to correspond to the controller's **logical** camera configuration.

After a change is made in a large Allegiant system with multiple Interface Units, 30 seconds may be required before the new settings take effect in all Interface Units.

Setting 900 is reserved for factory use. If the Interface Unit is inadvertently set to this value for more than 5 seconds before being set to its correct value, a power off/on may be required for the unit to return to its normal operating mode.

Select the step below that applies to your specific system configuration.

4.4.1 Group ID Settings When Using Allegiant RS-232 or RS-485 Protocol

When using the Allegiant data interface protocol, the Group ID must be set to correspond to a block of 16 **physical** camera numbers between 1-16 and 481-496. Since each block consists of 16 numbers, the Group ID number for these cameras ranges from 1 to 31. Select a Group ID number that does not duplicate another Group ID number.

A special case exists when multiple units are cascaded using the Interface Unit's RS-485 data connection (explained later). The left-most Group ID switch on the last unit must be set to **9**, to terminate the data link.

For example, if a total of 32 Bilinx-enabled cameras will be connected using the range of Allegiant inputs 17-32 and 49-64, one of the Interface Units must be set to Group ID **002**, and the other to **004**. If the Interface Unit for cameras 49-64 is the last unit connected at the end of the RS-485 data link, its actual Group ID should be set to **904**.

If only one Interface Unit will be connected to support Bilinx cameras on inputs 1 to 16, no change is required from the Interface Unit's default setting of **901**.

Set the Group ID switches using the supplied screwdriver, as follows:

Group ID Switches ¹	Camera Number Range	Group ID Switches ¹	Camera Number Range
001	1 to 16	017	257 to 272
002	17 to 32	018	273 to 288
003	33 to 48	019	289 to 304
004	49 to 64	020	305 to 320
005	65 to 80	021	321 to 336
006	81 to 96	022	337 to 352
007	97 to 112	023	353 to 368
008	113 to 128	024	369 to 384
009	129 to 144	025	385 to 400
010	145 to 160	026	401 to 416
011	161 to 176	027	417 to 432
012	177 to 192	028	433 to 448
013	193 to 208	029	449 to 464
014	209 to 224	030	465 to 480
015	225 to 240	031	481 to 496
016	241 to 256		

¹The last unit must be set to terminate the RS-485 data line, by setting the left-most Group ID switch to **9**.

If the Allegiant's camera number assignments will be changed (using the Allegiant Master Control Software package) to use **logical** camera numbers other than the default physical input numbers, Interface Units with Group ID ranging from 1 to 31 are automatically notified of the new settings, by the Allegiant system. This allows the system to support random camera numbers.

NOTE: If the Allegiant's logical camera number assignments are changed as described above, then downloaded into the Allegiant CPU, the update process may take up to 30 seconds. Camera control functions will not be available until this update has completed.

4.4.2 Switch Settings When Interfacing to Biphase Controller Devices

When using a biphase data interface, the Group ID switches must be set to correspond to a block of 16 **logical** camera numbers between 1-16 and 9985-9999. Since each block consists of 16 numbers, the Group ID number for these cameras range from 1 to 625. The Group ID number selected must not duplicate Group ID numbers already used.

The Interface Unit is set to **901** by default, and no change is required when only one Interface Unit is used in a system for cameras 1 to 16. Otherwise, use the supplied screwdriver to set the Group ID to correspond to the logical camera number range shown in the table below. For larger systems, refer to *APPENDIX A* for additional Group ID switch settings.

Group ID Switches	Camera Number Range	Group ID Switches	Camera Number Range	Group ID Switches	Camera Number Range
001	1 to 16	023	353 to 368	045	705 to 720
002	17 to 32	024	369 to 384	046	721 to 736
003	33 to 48	025	385 to 400	047	737 to 752
004	49 to 64	026	401 to 416	048	753 to 768
005	65 to 80	027	417 to 432	049	769 to 784
006	81 to 96	028	433 to 448	050	785 to 800
007	97 to 112	029	449 to 464	051	801 to 816
008	113 to 128	030	465 to 480	052	817 to 832
009	129 to 144	031	481 to 496	053	833 to 848
010	145 to 160	032	497 to 512	054	849 to 864
011	161 to 176	033	513 to 528	055	865 to 880
012	177 to 192	034	529 to 544	056	881 to 896
013	193 to 208	035	545 to 560	057	897 to 912
014	209 to 224	036	561 to 576	058	913 to 928
015	225 to 240	037	577 to 592	059	929 to 944
016	241 to 256	038	593 to 608	060	945 to 960
017	257 to 272	039	609 to 624	061	961 to 976
018	273 to 288	040	625 to 640	062	977 to 992
019	289 to 304	041	641 to 656	063	993 to 1008
020	305 to 320	042	657 to 672	064	1009 to 1024
021	321 to 336	043	673 to 688		
022	337 to 352	044	689 to 704		

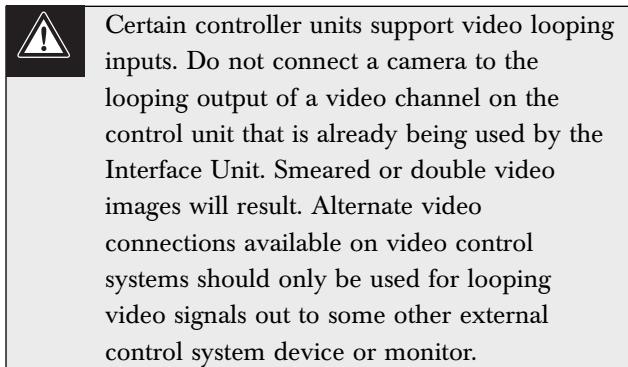
4.5 Video Connections to the Controller Unit

Video connections from the Interface Unit vary based on the type of video connections available on the controller, and the distance between the controller and the Interface Unit. Review the options in the table below to determine which best suits your configuration, then follow the appropriate section below:

Controller Type	Configuration Method	Max Separation Distance
Allegiant Series LTC 8200, LTC 8300, LTC 8600, LTC 8800, and LTC 8900, DESA ^{XL} DVR Series	Use 16-channel video ribbon cable, supplied with the LTC 8016	2 m (6 ft)
Any controller system using BNC connectors	Use the optional LTC 8508/01 16-channel ribbon-to-BNC video cable	1 m (3 ft)
Any controller system using BNC connectors	Use the 16-channel video ribbon cable supplied with the LTC 8016, to the optional LTC 8807/00 panel, then BNC to user-supplied video link	Distance is limited only by the type of user-supplied video transmission link

Video output signals from the Interface Unit are expecting to see a standard 75Ω termination. Unless a video input will be used to loop out to another device, make sure that the video inputs on the control unit are properly set to provide 75Ω video termination. For details on setting the video terminations of your controller device, refer to the device's installation instructions.

The video connections from the Interface Unit MUST be kept in consecutive order, and the group must always end at an exact multiple of 16. For example, the lowest camera group range is from 1 to 16. The next group range is from 17 to 32, and so on, up to the last group, that corresponds to the camera range of 9985 to 9999. Always make video connections to the controller following these guidelines.



4.5.1 Video Connections to Products Supporting Ribbon Cable Interface

Video connections from the Interface Unit to Allegiant models LTC 8200, LTC 8300, LTC 8600, LTC 8800, LTC 8900, and the DESA^{XL} Series Digital Video Recorders use the supplied video ribbon cable. Noting the video ribbon cable connector's orientation and alignment tab, connect one end of the supplied 16-channel ribbon cable to the back of the Interface Unit. Place the other end into the connector on the rear panel of the controller unit that corresponds to the **physical** camera number range previously determined by the Group ID switch settings (described above). For example, if the Group ID switches have been set to 003, the video ribbon cable should be installed into the Allegiant connector corresponding to video inputs 33 to 48.

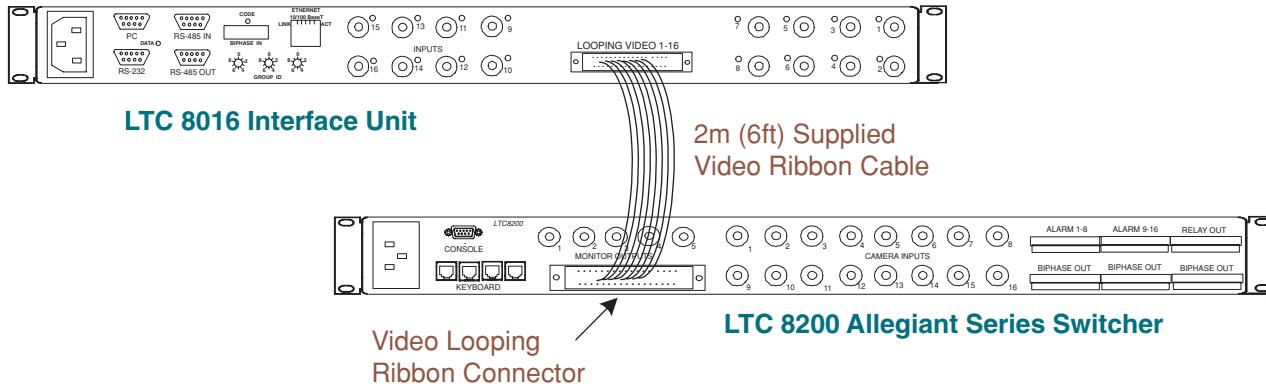


Figure 3 Interface Unit Video Connections to a Typical Allegiant System

4.5.2 Video Connections to Products via LTC 8508/01 Ribbon-to-BNC Cable

Video connections to Allegiant models LTC 8100, LTC 8500, and other products using BNC video connectors, can utilize the 1 m (3 ft) 16-channel LTC 8508/01 Ribbon-to-BNC cable (sold separately). One LTC 8508 cable is required for each Interface Unit being installed. Noting the connector orientation and alignment tab, connect the ribbon connector end of the cable to the Interface Unit. Attach the BNC

ends to the video inputs on the rear panel of the controller that corresponds to the **physical** camera number range previously determined by the Group ID switch settings above. For example, if the Group ID switches have been set to 001, the BNC ends of the video ribbon cable should be installed in the controller's video inputs 1 to 16. For your convenience, the BNC ends are marked with the video channel number.

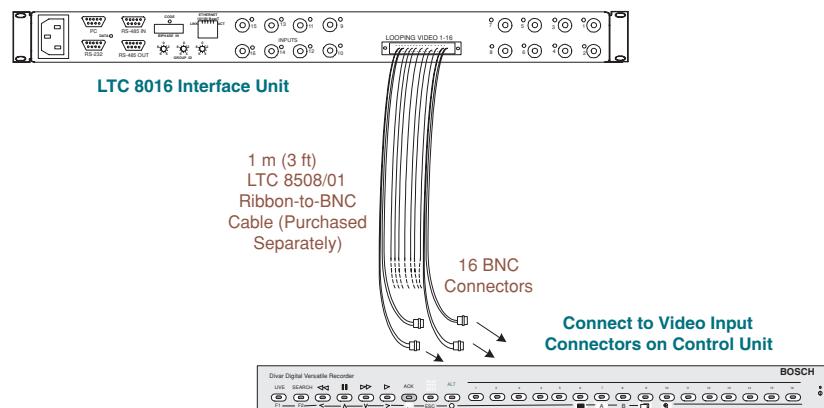


Figure 4 Typical Video Connections to Divar Series DVR Control Units

4.5.3 Video Connections to Products via LTC 8807/00 Video Interconnect Panel

If using a rack-mountable BNC patch panel, or if the Interface Unit will be remoted some distance from the controller unit, an LTC 8807/00 Video Interconnect Panel (sold separately) can be used for video connections to a controller. Each LTC 8807 panel can be used with up to two Interface Units, supporting a maximum of 32 cameras. Connect the supplied video ribbon cable from the Interface Unit into the upper connector on the back of the LTC 8807 for the first block of 16 cameras. The lower connector is only used if a second Interface Unit will be connected, providing a second block of 16 cameras.

User-supplied coax jumper cables are required to complete the video connections between the LTC 8807 panel and the BNC connectors on the controller unit. Attach the coax to the video inputs on the rear panel of the controller bay, that correspond to the **physical** camera number range previously determined by the Group ID switch settings above. For example, if the Group ID switches have been set to 001, the coax cables should be installed into the controller's video inputs 1 to 16.

If the control unit will be located at a remote distance from the Interface Unit, standard practices for video signal transmission, and the associated data interface, should be used (more details provided in the next section).

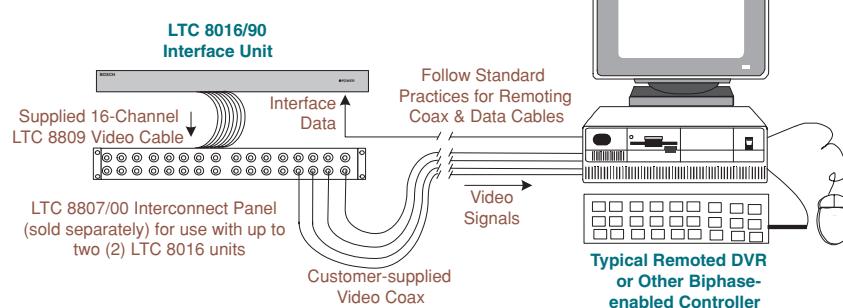


Figure 5 Video Connections to Control System Located at Remote Site

4.6 Allegiant Series Switcher Data Interface

4.6.1 Allegiant Interface Configurations

When using the Allegiant data interface protocol, up to 31 Interface Units can be connected to a single large Allegiant system. In this configuration, bi-directional Bilinx communication to physical cameras ranging from 1 to 496 is supported. In very large systems, additional units can be interfaced to the Allegiant via biphasic data connection.

When connecting to an Allegiant system, select a data port on the main Allegiant CPU that will be used to communicate with the Interface Unit. The Interface Unit provides separate interface connectors so it is able to support both RS-232 and RS-485 Allegiant interfaces.



Only one port on the Interface Unit can be used at a time. Connecting data cables to more than one port on the Interface Unit simultaneously could result in non-operation.

4.6.1.1 Allegiant Interface Port Selection

Based on the Allegiant model being used, select an available CPU port from the table below. Note that it is not possible to connect the Interface Unit cable to a Console port provided by an Allegiant LTC 8712 Series Port Expander accessory unit.

Allegiant Model	Supported Ports				
	CONSOLE	PRINTER	ALARM1	COM1	COM2
LTC 8100	YES	NO	NO	NO	NO
LTC 8200	YES	NO	NO	NO	NO
LTC 8300	YES	YES	NO	NO	NO
LTC 8500	YES	YES	YES	NO	NO
LTC 8600	YES	YES	YES	YES	YES
LTC 8800	YES	YES	YES	YES	YES
LTC 8900	YES	YES	YES	YES	YES



The ALARM port requires a special cable pinout. DO NOT USE the supplied cable for this port connection. A cable must be constructed by the installer, per the pinouts shown in the *CONNECTOR & CABLE PINOUTS* Section.

4.6.1.2 Setting the Allegiant System to Use Bilinx Communication Mode

Using Allegiant Keyboard User Function 39, a system keyboard operator with Level 1 Priority must configure the Allegiant to enable the communication interface on the selected port.

IntuiKey Series Keyboard:

From the main Allegiant screen, navigate to the **User Functions** menu screen, then press [**Enter User Command**]. Key in 39, then press [**Enter**].

LTC 8555 or LTC 8550 Series Keyboard:

Press [**USER**], key in 39, then press [**Enter**].

The monitor's on-screen text will indicate the current configuration mode, such as **NO DIU OPERATION** (i.e., meaning **No Data Interface Unit Operation**) on a non-configured system. Use the keyboard joystick up/down to navigate through the available port options. Enter the operator password when prompted, and press [**Enter**] to select the port currently shown.

The port is now configured with the proper baud rate and handshake settings to communicate with the Interface Unit.

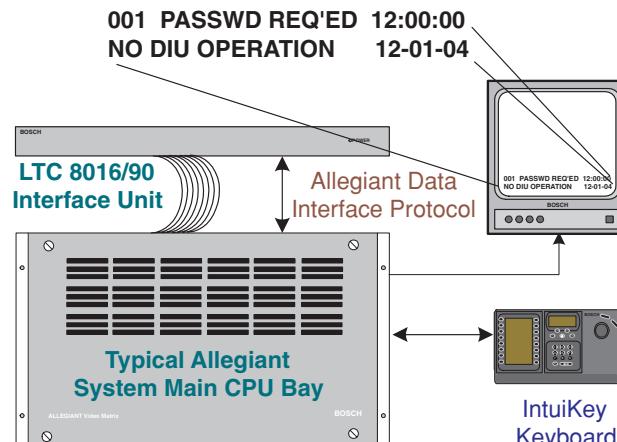


Figure 6 Allegiant On-screen Setup Procedure for Bilinx Operation



If the on-screen option reads **No CTS Operation**, the CPU firmware version is older than the revision needed for compatibility with Bilinx communication. On Allegiant systems sold after 1995, CPU upgrades can be done from an external PC using a software download approach. Older systems (i.e., having CPU modules with a single 8-position dip switch) can be upgraded by replacing the CPU module. Contact the nearest Bosch Security Systems Sales Representative or Tech Support specialist for additional details on Allegiant CPU upgrades.

A system reset is required to complete the process. Either use **Keyboard User Function 15**, or power off/on the main Allegiant CPU bay. The Allegiant is then ready to communicate with the Interface Unit.

4.6.2 Allegiant Data Connections Using a Single Interface Unit

Use the supplied 3 m (10 ft) data interface cable to connect the Allegiant to the Interface Unit. Connect one end of the cable to the Allegiant port selected in the previous section, and the other end of the cable to the Interface Unit port, according to the following guide:

If an Allegiant CONSOLE, PRINTER, or ALARM port is being used, connect the cable to the **RS-232** connector on the rear of the Interface Unit.

If an Allegiant COM1 or COM2 port is being used, connect the cable to the **RS-485 IN** connector on the rear of the Interface Unit.

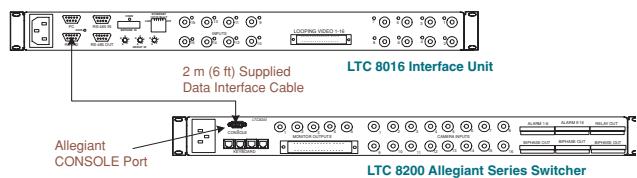


Figure 7 Data Interface Connection Detail When Using Large Model Allegiant System

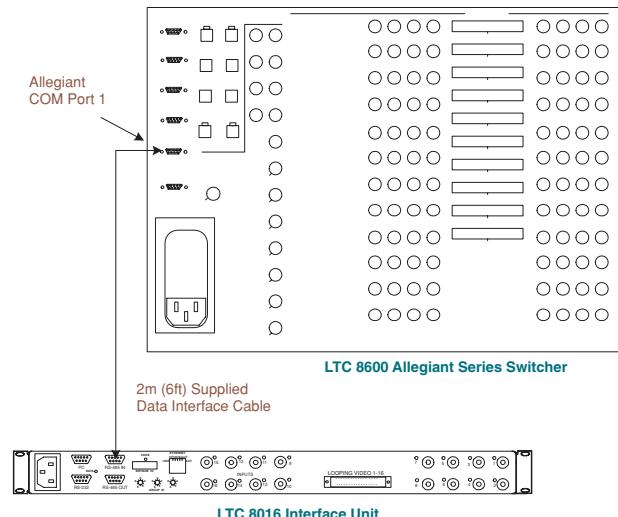


Figure 8 Data Interface Connection Detail When Using Large Model Allegiant System

Once a connection is established between the Interface Unit and the Allegiant, an automatic download of the Allegiant's **physical camera-to-logical camera** table is sent to the Interface Unit. Prior to this update, the front panel LED on the Interface Unit flashes to indicate that it is waiting for the information to be received. Once the LED changes to a steady condition, configuration is complete.

4.6.3 Allegiant Data Connections Using Multiple Interface Units

Up to 31 units can be connected to a single Allegiant switcher, using a **daisychain** data interface configuration. This provides support for up to 496 Bilinx cameras. Since the same data is being sent to all Interface Units in the chain, it does not matter what order is used when connecting the data lines between the units. Simply connect the supplied 3 m (10 ft) data interface cable from the **RS-485 OUT** connector of one Interface Unit to the **RS-485 IN** of the next unit.

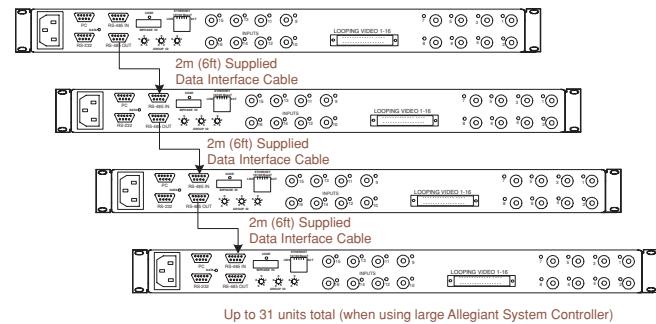
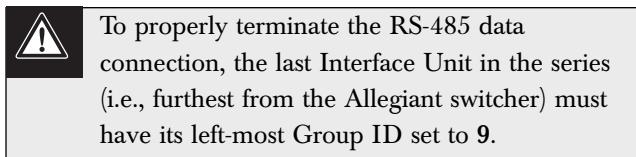


Figure 9 Data Interface Connection Detail When Using Multiple Interface Units

Daisychain configurations can only be used when the data connection from the controller to the Interface Unit utilizes either an **RS-232** or **RS-485** data port. Do not use this method if the data connection from a controller uses the biphase data port.

4.7 Data Connection to a Biphase Generating Device

The Interface Unit is designed to support data connections from other head-end controller devices with the ability to generate Bosch Security Systems biphase control data. Since biphase protocol is a single direction communication format, control of P/T/Z functions, auxiliaries, and pre-positions are fully supported, but it is not possible to receive any data back from the camera site. This means that reporting of alarms or other camera site-related events is not possible with a biphase data connection.

To connect the Interface Unit to a biphasic controller, attach the biphasic data cable from the controller to the biphasic input terminal block on the rear panel of the Interface Unit. Use the straight slot end of the supplied offset screwdriver to tighten the terminal block screws. The Interface Unit supports **daisychain** biphasic

connections to simplify connection to multiple Interface Units. If this type of connection is necessary, remove the termination resistor from the biphasic output terminal block, and connect another user-supplied shielded twisted pair cable from the output of one Interface Unit to the input of another.

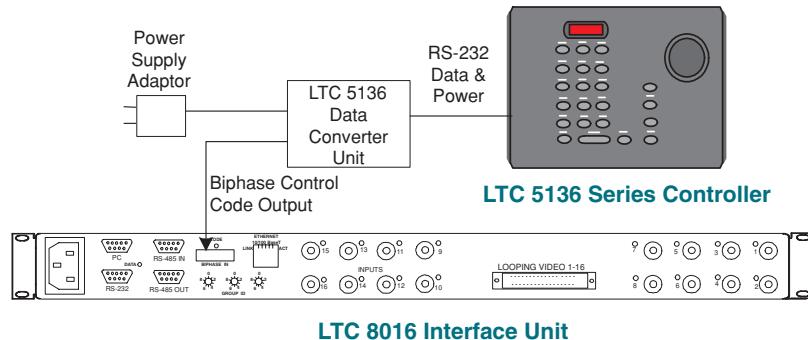


Figure 10 Biphasic Data Interface Connection Detail

4.8 Data Connections Using Biphasic RS-232 Protocol

The Interface Unit can be connected directly to Bosch Security System products that generate biphasic control data in RS-232 format. These products include the PC-based DiBos, and DESA Series Digital Video Recorders.

Typically, the RS-232 interface of the controller first connects to an optional LTC 8786 or LTC 8780 Data Converter accessory unit. The outputs from the Data Converter Unit can be connected to P/T/Z cameras or other devices designed to receive standard biphasic code protocol.

Although the LTC 8016 is capable of receiving standard biphasic protocol, it can also directly accept biphasic in an RS-232 format. Any controller capable

of generating biphasic data in an RS-232 format operating at 9600, 19200, 57600, or 115200 baud, with 8 data bits, no parity, and 1 stop bit, can be connected to the Interface Unit.

When RS-232 communication is first established, the Interface Unit may require 3 to 5 seconds to automatically detect and adjust to the controller's baud rate. No control of cameras is possible until this process is completed.

Refer to the portion of the next section that is applicable to your configuration, based on the controller product being connected to the Interface Unit.

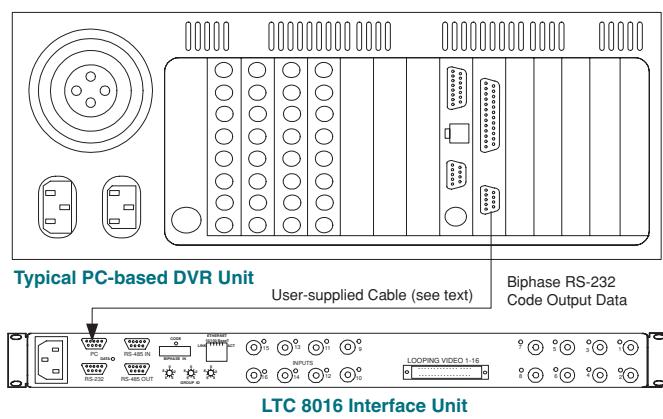


Figure 11 Biphasic RS-232 Data Interface Connection Detail

4.8.1 Connecting to DiBos Digital Video Recorders

A RS-232 grade data cable (not supplied) is required to connect the DiBos DVR to the LTC 8016 Interface Unit. A Bosch Security System's S1385 cable can be purchased separately, or one can be constructed based on the pinouts in the *CONNECTOR AND CABLE PINOUTS Section*.

Connect one end of the RS-232 data cable to an available COM port on the DiBos, and the other end of the cable to the PC port on the Interface Unit. The DiBos software must now be configured to send the biphasic PTZ commands out of its COM2 port (rather than the default COM1 port). For details on this configuration option, refer to the appropriate section in the DiBos instruction manual.

4.8.2 Connecting to DESA and DESA-8 Series Digital Video Recorders

A RS-232 grade data cable (not supplied) is required to connect the DESA DVR to the LTC 8016 Interface Unit. A Bosch Security System's S1385 cable can be purchased separately, or one can be constructed based on the pinouts in the *CONNECTOR AND CABLE PINOUTS Section*.

Connect one end of the RS-232 data cable to the COM2 port on the DESA, and the other end of the cable to the PC port on the Interface Unit. The DESA software must now be configured to send the biphasic PTZ commands out of its COM2 port (rather than the default COM1 port). For details on this configuration option, refer to the appropriate section in the DESA instruction manual.

4.8.3 Connecting to DESA^{XL} Series Digital Video Recorders

A user-supplied RS-232 grade data cable is required to connect the DESA^{XL} DVR to the LTC 8016 Interface Unit. The interface cable must either be purchased locally, or constructed based on the pinouts in the *CONNECTOR AND CABLE PINOUTS Section*.

Connect one end of the RS-232 data cable to the end of the Watchdog/PTZ cable connected to the DESA's COM1 port, and the other end of the cable to the PC port on the Interface Unit.

5.0 TYPICAL CONFIGURATION DIAGRAMS

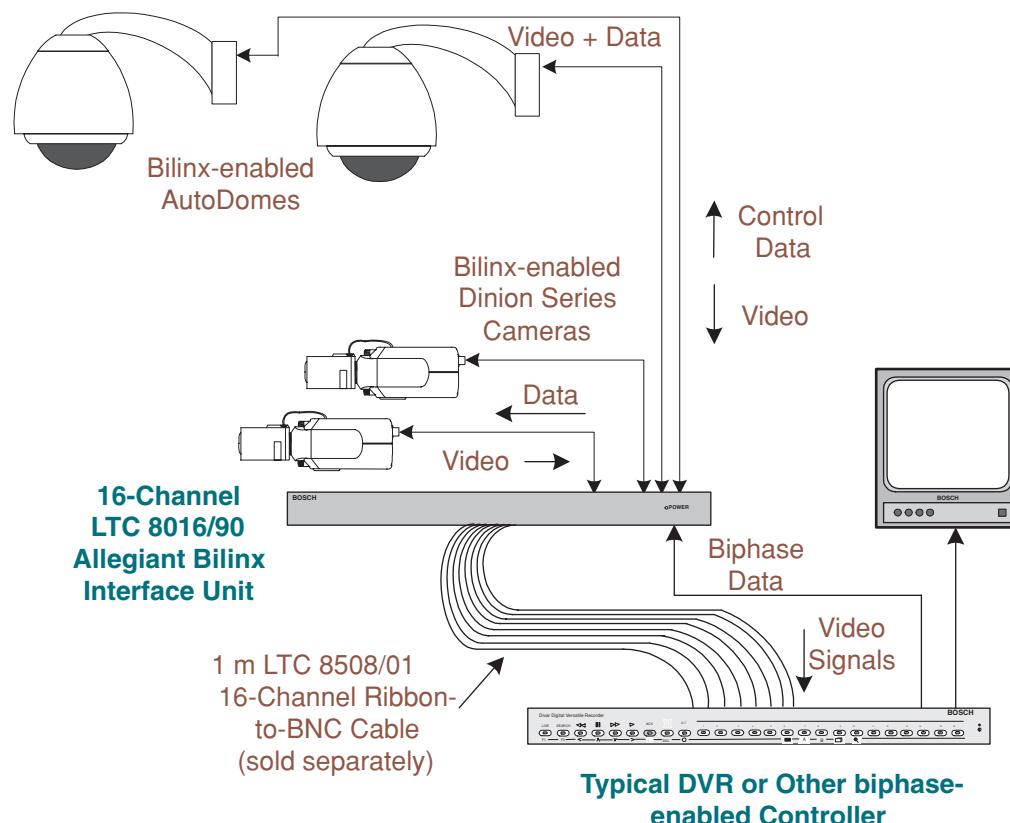


Figure 12 Typical Interface Unit Connected to DVR Control Unit

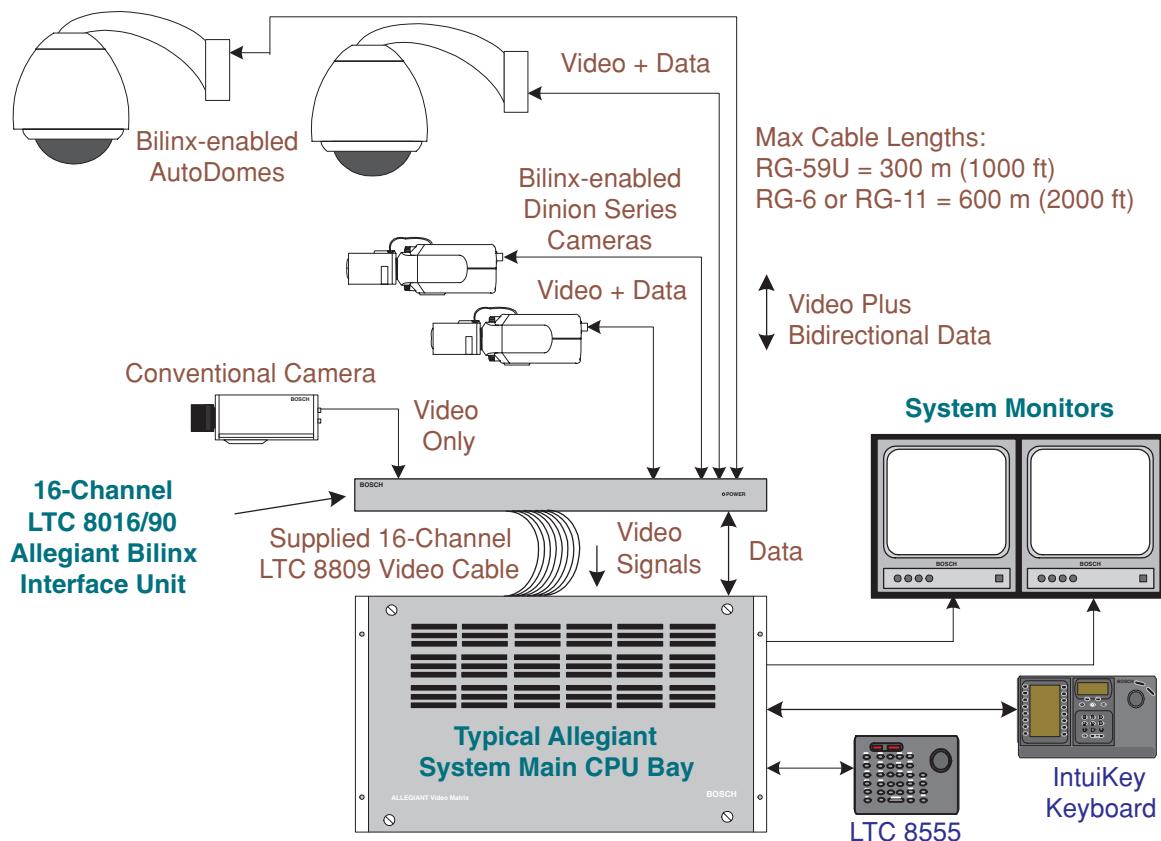


Figure 13 Typical Interface Unit Connected to Allegiant Switching System

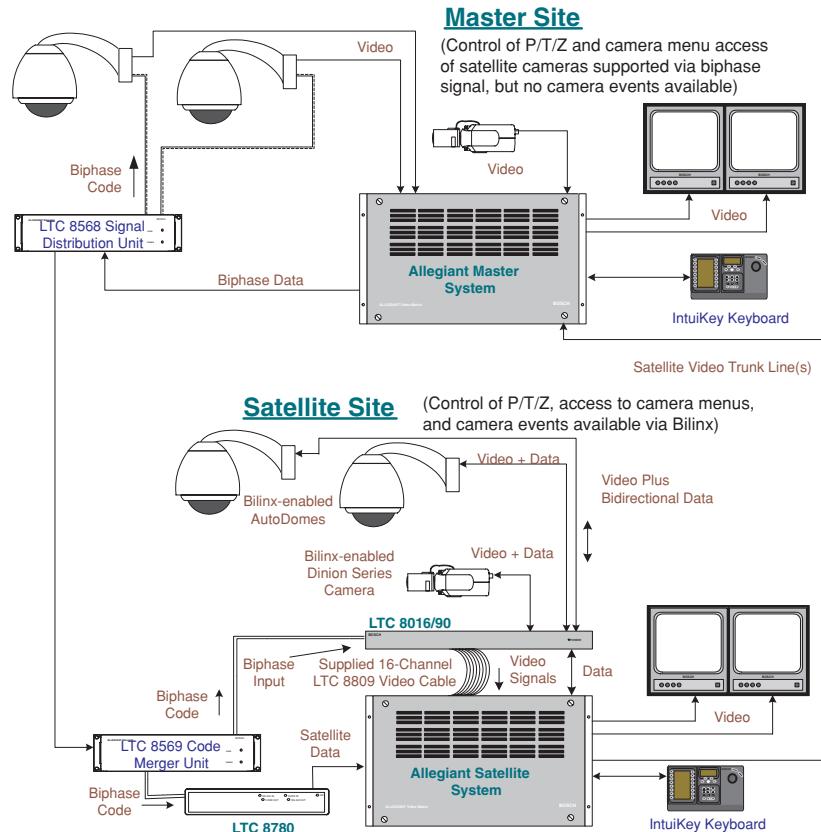


Figure 14 Interface Unit Used in Allegiant Satellite System Configuration

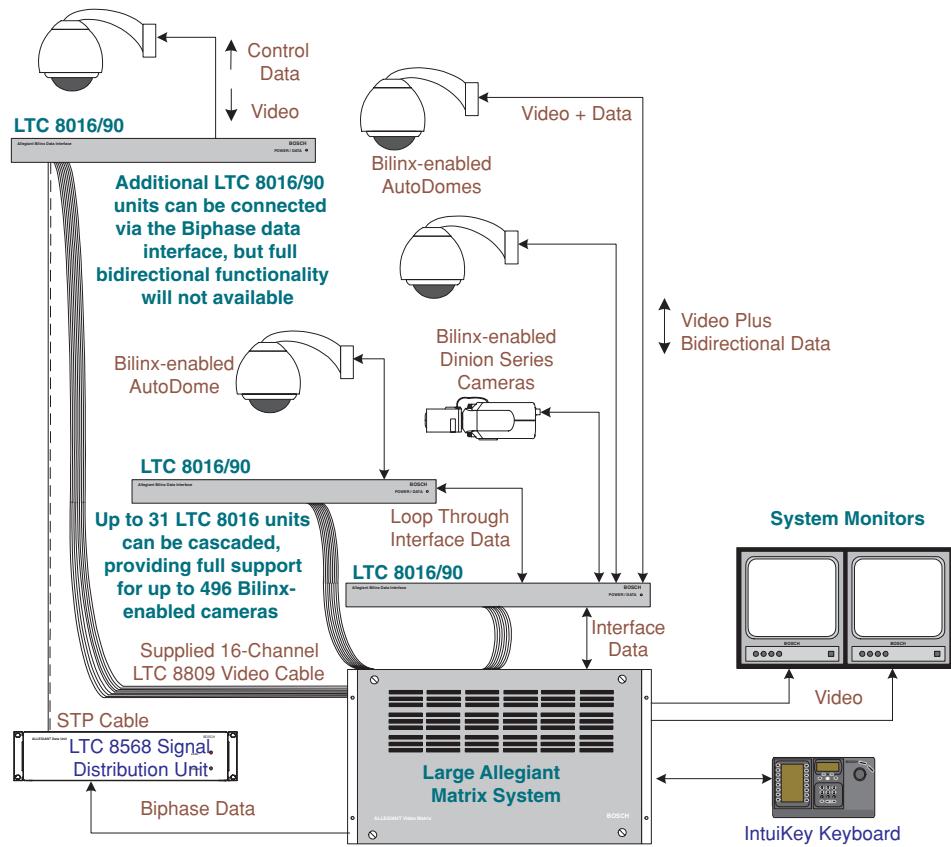


Figure 15 Large Allegiant System with Several Interface Units

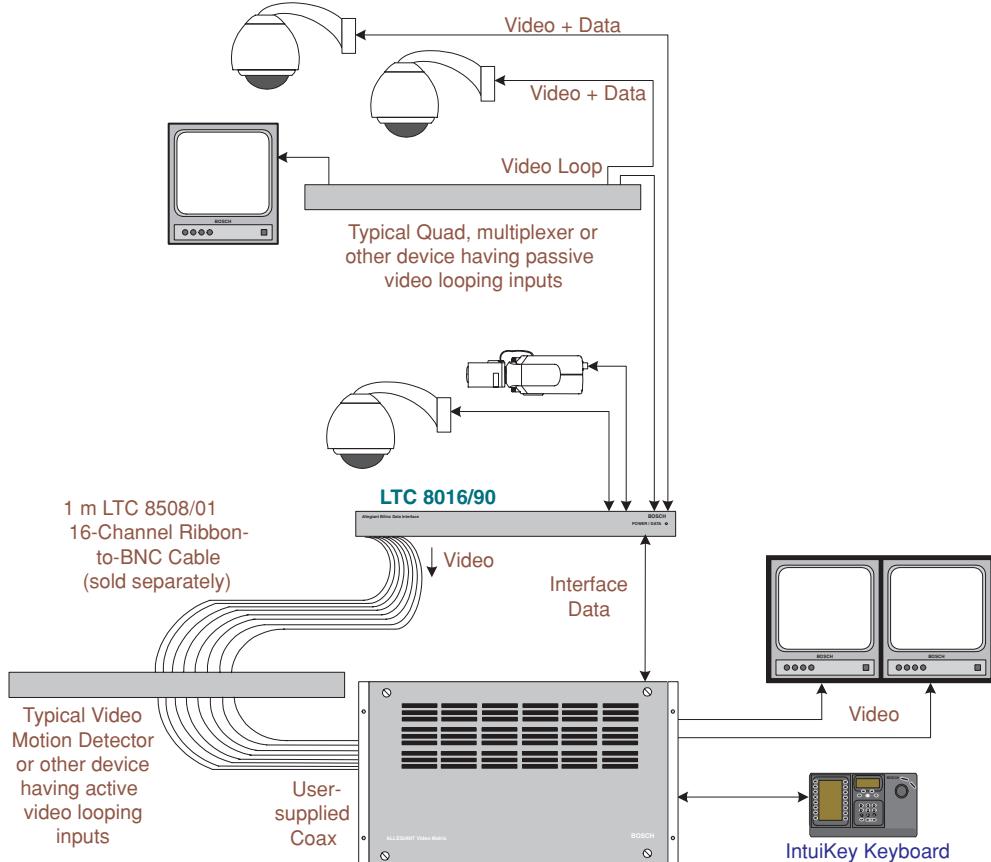


Figure 16 Recommended Configuration When Using Bilinx with Other Devices

6.0 OPERATION

Once installation is finished, operation of this unit is completely automatic. Refer to the applicable section of the manual supplied with the control device and/or camera for details regarding their features/functions.

The Interface Unit is designed to process camera contact alarm and motion event messages from cameras that support this functionality. The Interface Unit can also detect **Dark Alarm** signal conditions when the

video amplitude level drops below 15 IRE. When the Interface is connected to an Allegiant system using the Allegiant data interface, messages can be sent to the controller to notify the system of these events. By default, camera contact alarm input 1 will result in a standard Allegiant system alarm response, assuming an alarm response mode has been configured in the system. System responses to camera alarms 2 to 4, and the **Dark Alarm** require programming of the Allegiant system using the PC-based Allegiant LTC 8059 Master Control Software, version 2.7 or later.

7.0 DEVICE OUTLINE



Figure 17 Front Panel

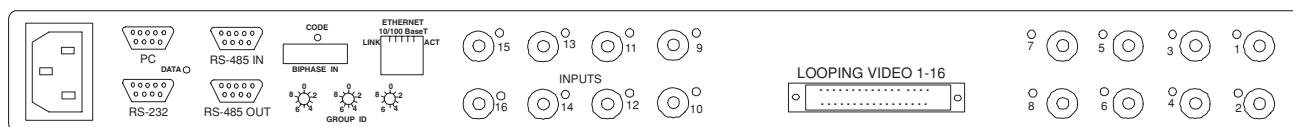


Figure 18 Rear Panel

8.0 CONNECTOR AND CABLE PINOUTS

8.1 LTC 8016 Connector Pinouts

6-Position CODE Connector ¹	
Pin	Connection
1	Shield
2	Biphase Data --
3	Biphase Data +
4	Shield
5	Biphase Data --
6	Biphase Data +

¹Pins are not numbered; the numbers represent the pin sequence from left to right.

9-Pin RS-232 Connector	
Pin	Connection
1	Data Gnd
2	RTS
3	CTS
4	Tx
5	Rx
6	--
7	Data Gnd
8	--
9	--

9-Pin PC Connector		
Pin	Connection	Old Pinouts ²
1	--	--
2	Rx	Tx
3	Tx	Rx
4	--	--
5	Data Gnd	Data Gnd
6	--	--
7	RTS	CTS
8	CTS	RTS
9	--	--

²Pinouts used on units manufactured before July, 2004 (date code 0426).

9-Pin RS-485 IN Connectors	
Pin	Connection
1	--
2	TXD+
3	TXD--
4	RXD+
5	RXD--
6	--
7	--
8	--
9	--

9-Pin RS-485 OUT Connectors	
Pin	Connection
1	--
2	RXD+
3	RXD--
4	TXD+
5	TXD--
6	--
7	--
8	--
9	--

8.2 Supplied Serial Data Cable Pinouts

9-Pin Male	9-Pin Male
1	--
2	4
3	5
4	2
5	3
6	--
7	--
8	--
9	--

8.3 Miscellaneous Cables (Not supplied)

Bosch S1385 or Industry standard Null modem RS-232 Data Cable (Required if connecting the LTC 8016 directly to the COM port on PC)

9-Pin Female (PC COM Port)	9-Pin Female ¹ (LTC 8016 PC)
1,6	4
2	3
3	2
4	1,6
5	5
7	8
8	7
9	--

¹The PC connector on units manufactured before July, 2004 (date code 0426) used a male 9-pin connector for this port.

Industry type straight through RS-232 Data Cable (Required if connecting the LTC 8016 to a Watchdog/PTZ connector on the DESA^{XL} DVR)

9-Pin Male (DVR COM Port)	9-Pin Female ² (LTC 8016 PC Port)
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9

²The PC connector on units manufactured before July, 2004 (date code 0426) used a male 9-pin connector for this port.

9-Pin to 9-Pin Serial Data Cable for Allegiant Alarm Port (Required if connecting the LTC 8016 to the Allegiant Alarm Port)

9-Pin Male (Alarm Port)	9-Pin Male (LTC 8016 RS-232 Port)
1 RTS	3 CTS
2 Tx	5 Rx
3 Chassis Gnd	--
4 Data Gnd	1 Data Gnd
5 Data Gnd	7 Data Gnd
6 Rx	4 Tx
7 CTS	2 RTS
8 No Connection	--
9 No Connection	--

9.0 MAINTENANCE

The Allegiant Bilinx Data Interface Unit does not require any special maintenance.

10.0 TROUBLESHOOTING

Problem	Possible Cause and Solution
Complete lack of operation after installation	<p>a) Three to five seconds after being powered up, if no LEDs (on front and rear panel) indicate activity, verify that the AC power cord is connected, and the AC power source is energized.</p> <p>b) If some of the LEDs are active, refer to the <i>LED INDICATORS</i> Section below for additional information.</p> <p>c) The Interface Unit has been inadvertently set to Group ID 900 for more than 5 seconds. Set the Group ID to the correct setting and power off/on the Interface Unit to return it to its normal operating mode.</p>
No PTZ or menu access is possible on Bilinx-enabled camera	<p>a) If the Channel LED does not indicate Bilinx communication, verify that the camera is designed to support Bilinx communication. Refer to the <i>COMPATIBILITY INFORMATION</i> Section. The Video Input Channel LEDs can indicate whether the LTC 8016 is using Bilinx communication. Refer to the <i>LED INDICATORS</i> Section below for additional information.</p> <p>b) Verify that the Interface Unit is connected to the correct block of system video inputs based on the Group ID switch settings.</p> <p>c) The camera is located at a distance that exceeds Bilinx communication limits. Refer to the <i>CAMERA VIDEO CONNECTIONS</i> Section for maximum distance details.</p> <p>d) Up to 20 seconds may be required when a Bilinx-enabled camera is first connected to the Interface Unit before control is possible. No response before this time has elapsed should be considered normal.</p>
No video on control unit	<p>a) The Video interface cable from Interface Unit is not connected to the correct input of the control unit.</p> <p>b) The Interface Unit has not been connected to an AC power source.</p>
Erratic or no control of cameras when multiple Interface Units are in use	Verify that each Interface Unit is set to a unique Group ID number.
Smeared or double video images are present on controller output	Verify that a camera signal has not been connected to the looping output of a video channel on the control unit that's already in use by the Interface Unit.

11.0 LED INDICATORS

The Allegiant Bilinx Data Interface Unit incorporates several LEDs that indicate various status conditions. These LEDs are helpful when troubleshooting a problem.

LED	Description
Behavior ON steady	<p><u>Condition</u></p> <ul style="list-style-type: none"> The Interface Unit is operating normally, and has received the Allegiant's logical-to-physical camera table
FLASHING at 50% duty cycle	<ul style="list-style-type: none"> The Interface Unit is operating normally, but has not received the Allegiant's logical-to-physical camera table
FLASHING randomly	<ul style="list-style-type: none"> The Interface Unit is operating normally, and the LED is following the action of biphasic data being received
Video Input Channel Indicators	<p>The Channel LEDs indicate the status of the video input signal. A Channel LED behaves according to the following table:</p>
Behavior ON with occasional flash	<p><u>Condition</u></p> <ul style="list-style-type: none"> Indicates connection to a Bilinx-enabled camera
ON with rapid flashing	<ul style="list-style-type: none"> Indicates control of a Bilinx-enabled camera
OFF with rapid flashing	<ul style="list-style-type: none"> Indicates control of a Bilinx-enabled camera, but the video level is below acceptable limits, indicating a <i>Dark Alarm</i> condition
ON	<ul style="list-style-type: none"> Indication when connected to a non-Bilinx-enabled camera having an acceptable video level
OFF with flashing at 50% duty cycle	<ul style="list-style-type: none"> No video is present from a non-Bilinx-enabled camera, indicating a <i>Dark Alarm</i> condition
LINK LED	When illuminated, indicates that a valid physical connection exists between the Interface Unit and the RS-232 port of a controller unit.
DATA LED	Flashes to indicate that the Interface Unit is receiving valid data from a controller unit during serial communications.
CODE LED	Flashes to indicate that the Interface Unit is receiving biphasic data from a controller unit.
Ethernet port LINK & ACT LEDs	Not used in current implementation (reserved for future use).

12.0 REPLACEMENT PARTS

Description	Part Number
16-Channel Video Ribbon Cable	LTC 8809/00
3 m (10 ft) Data Interface Cable	303-2173-504
Replacement AC Line Cord, 120 VAC	Source from local supplier
Replacement AC Line Cord, 220-240 VAC	Source from local supplier
6-Position Terminal Block with 100Ω Terminating Resistor	303-4118-506
Offset Screwdriver	303-4411-001

13.0 COMMON ACCESSORY PARTS

Description	Part Number
1 m (3 ft) 16-Channel Video Ribbon-to-BNC Cable	LTC 8508/01
32-Channel Video Interconnect Panel	LTC 8807/00
Industry Standard Null Modem RS-232 Cable	S1385

APPENDIX A - Group ID Settings for Large Systems

065	1025 to 1040	145	2305 to 2320	225	3585 to 3600	305	4865 to 4880	385	6145 to 6160	465	7425 to 7440	545	8705 to 8720
066	1041 to 1056	146	2321 to 2336	226	3601 to 3616	306	4881 to 4896	386	6161 to 6176	466	7441 to 7456	546	8721 to 8736
067	1057 to 1072	147	2337 to 2352	227	3617 to 3632	307	4897 to 4912	387	6177 to 6192	467	7457 to 7472	547	8737 to 8752
068	1073 to 1088	148	2353 to 2368	228	3633 to 3648	308	4913 to 4928	388	6193 to 6208	468	7473 to 7488	548	8753 to 8768
069	1089 to 1104	149	2369 to 2384	229	3649 to 3664	309	4929 to 4944	389	6209 to 6224	469	7489 to 7504	549	8769 to 8784
070	1105 to 1120	150	2385 to 2400	230	3665 to 3680	310	4945 to 4960	390	6225 to 6240	470	7505 to 7520	550	8785 to 8800
071	1121 to 1136	151	2401 to 2416	231	3681 to 3696	311	4961 to 4976	391	6241 to 6256	471	7521 to 7536	551	8801 to 8816
072	1137 to 1152	152	2417 to 2432	232	3697 to 3712	312	4977 to 4992	392	6257 to 6272	472	7537 to 7552	552	8817 to 8832
073	1153 to 1168	153	2433 to 2448	233	3713 to 3728	313	4993 to 5008	393	6273 to 6288	473	7553 to 7568	553	8833 to 8848
074	1169 to 1184	154	2449 to 2464	234	3729 to 3744	314	5009 to 5024	394	6289 to 6304	474	7569 to 7584	554	8849 to 8864
075	1185 to 1200	155	2465 to 2480	235	3745 to 3760	315	5025 to 5040	395	6305 to 6320	475	7585 to 7600	555	8865 to 8880
076	1201 to 1216	156	2481 to 2496	236	3761 to 3776	316	5041 to 5056	396	6321 to 6336	476	7601 to 7616	556	8881 to 8896
077	1217 to 1232	157	2497 to 2512	237	3777 to 3792	317	5057 to 5072	397	6337 to 6352	477	7617 to 7632	557	8897 to 8912
078	1233 to 1248	158	2513 to 2528	238	3793 to 3808	318	5073 to 5088	398	6353 to 6368	478	7633 to 7648	558	8913 to 8928
079	1249 to 1264	159	2529 to 2544	239	3809 to 3824	319	5089 to 5104	399	6369 to 6384	479	7649 to 7664	559	8929 to 8944
080	1265 to 1280	160	2545 to 2560	240	3825 to 3840	320	5105 to 5120	400	6385 to 6400	480	7665 to 7680	560	8945 to 8960
081	1281 to 1296	161	2561 to 2576	241	3841 to 3856	321	5121 to 5136	401	6401 to 6416	481	7681 to 7696	561	8961 to 8976
082	1297 to 1312	162	2577 to 2592	242	3857 to 3872	322	5137 to 5152	402	6417 to 6432	482	7697 to 7712	562	8977 to 8992
083	1313 to 1328	163	2593 to 2608	243	3873 to 3888	323	5153 to 5168	403	6433 to 6448	483	7713 to 7728	563	8993 to 9008
084	1329 to 1344	164	2609 to 2624	244	3889 to 3904	324	5169 to 5184	404	6449 to 6464	484	7729 to 7744	564	9009 to 9024
085	1345 to 1360	165	2625 to 2640	245	3905 to 3920	325	5185 to 5200	405	6465 to 6480	485	7745 to 7760	565	9025 to 9040
086	1361 to 1376	166	2641 to 2656	246	3921 to 3936	326	5201 to 5216	406	6481 to 6496	486	7761 to 7776	566	9041 to 9056
087	1377 to 1392	167	2657 to 2672	247	3937 to 3952	327	5217 to 5232	407	6497 to 6512	487	7777 to 7792	567	9057 to 9072
088	1393 to 1408	168	2673 to 2688	248	3953 to 3968	328	5233 to 5248	408	6513 to 6528	488	7793 to 7808	568	9073 to 9088
089	1409 to 1424	169	2689 to 2704	249	3969 to 3984	329	5249 to 5264	409	6529 to 6544	489	7809 to 7824	569	9089 to 9104
090	1425 to 1440	170	2705 to 2720	250	3985 to 4000	330	5265 to 5280	410	6545 to 6560	490	7825 to 7840	570	9105 to 9120
091	1441 to 1456	171	2721 to 2736	251	4001 to 4016	331	5281 to 5296	411	6561 to 6576	491	7841 to 7856	571	9121 to 9136
092	1457 to 1472	172	2737 to 2752	252	4017 to 4032	332	5297 to 5312	412	6577 to 6592	492	7857 to 7872	572	9137 to 9152
093	1473 to 1488	173	2753 to 2768	253	4033 to 4048	333	5313 to 5328	413	6593 to 6608	493	7873 to 7888	573	9153 to 9168
094	1489 to 1504	174	2769 to 2784	254	4049 to 4064	334	5329 to 5344	414	6609 to 6624	494	7889 to 7904	574	9169 to 9184
095	1505 to 1520	175	2785 to 2800	255	4065 to 4080	335	5345 to 5360	415	6625 to 6640	495	7905 to 7920	575	9185 to 9200
096	1521 to 1536	176	2801 to 2816	256	4081 to 4096	336	5361 to 5376	416	6641 to 6656	496	7921 to 7936	576	9201 to 9216
097	1537 to 1552	177	2817 to 2832	257	4097 to 4112	337	5377 to 5392	417	6657 to 6672	497	7937 to 7952	577	9217 to 9232
098	1553 to 1568	178	2833 to 2848	258	4113 to 4128	338	5393 to 5408	418	6673 to 6688	498	7953 to 7968	578	9233 to 9248
099	1569 to 1584	179	2849 to 2864	259	4129 to 4144	339	5409 to 5424	419	6689 to 6704	499	7969 to 7984	579	9249 to 9264
100	1585 to 1600	180	2865 to 2880	260	4145 to 4160	340	5425 to 5440	420	6705 to 6720	500	7985 to 8000	580	9265 to 9280
101	1601 to 1616	181	2881 to 2896	261	4161 to 4176	341	5441 to 5456	421	6721 to 6736	501	8001 to 8016	581	9281 to 9296
102	1617 to 1632	182	2897 to 2912	262	4177 to 4192	342	5457 to 5472	422	6737 to 6752	502	8017 to 8032	582	9297 to 9312
103	1633 to 1648	183	2913 to 2928	263	4193 to 4208	343	5473 to 5488	423	6753 to 6768	503	8033 to 8048	584	9329 to 9344
104	1649 to 1664	184	2929 to 2944	264	4209 to 4224	344	5489 to 5504	424	6769 to 6784	504	8049 to 8064	585	9345 to 9360
105	1665 to 1680	185	2945 to 2960	265	4225 to 4240	345	5505 to 5520	425	6785 to 6800	505	8065 to 8080	586	9361 to 9376
106	1681 to 1696	186	2961 to 2976	266	4241 to 4256	346	5521 to 5536	426	6801 to 6816	506	8081 to 8096	587	9377 to 9392
107	1697 to 1712	187	2977 to 2992	267	4257 to 4272	347	5537 to 5552	427	6817 to 6832	507	8097 to 8112	588	9393 to 9408
108	1713 to 1728	188	2993 to 3008	268	4273 to 4288	348	5553 to 5568	428	6833 to 6848	508	8113 to 8128	589	9409 to 9424
109	1729 to 1744	189	3009 to 3024	269	4289 to 4304	349	5569 to 5584	429	6849 to 6864	509	8129 to 8144	590	9425 to 9440
110	1745 to 1760	190	3025 to 3040	270	4305 to 4320	350	5585 to 5600	430	6865 to 6880	510	8145 to 8160	591	9441 to 9456
111	1761 to 1776	191	3041 to 3056	271	4321 to 4336	351	5601 to 5616	431	6881 to 6896	511	8161 to 8176	592	9457 to 9472
112	1777 to 1792	192	3057 to 3072	272	4337 to 4352	352	5617 to 5632	432	6897 to 6912	512	8177 to 8192	593	9473 to 9488
113	1793 to 1808	193	3073 to 3088	273	4353 to 4368	353	5633 to 5648	433	6913 to 6928	513	8193 to 8208	594	9489 to 9504
114	1809 to 1824	194	3089 to 3104	274	4369 to 4384	354	5649 to 5664	434	6929 to 6944	514	8209 to 8224	595	9505 to 9520
115	1825 to 1840	195	3105 to 3120	275	4385 to 4400	355	5665 to 5680	435	6945 to 6960	515	8225 to 8240	596	9521 to 9536
116	1841 to 1856	196	3121 to 3136	276	4401 to 4416	356	5681 to 5696	436	6961 to 6976	516	8241 to 8256	597	9537 to 9552
117	1857 to 1872	197	3137 to 3152	277	4417 to 4432	357	5697 to 5712	437	6977 to 6992	517	8257 to 8272	598	9553 to 9568
118	1873 to 1888	198	3153 to 3168	278	4433 to 4448	358	5713 to 5728	438	6993 to 7008	518	8273 to 8288	599	9569 to 9584
119	1889 to 1904	199	3169 to 3184	279	4449 to 4464	359	5729 to 5744	439	7009 to 7024	519	8289 to 8304	600	9585 to 9600
120	1905 to 1920	200	3185 to 3200	280	4465 to 4480	360	5745 to 5760	440	7025 to 7040	520	8305 to 8320	601	9601 to 9616
121	1921 to 1936	201	3201 to 3216	281	4481 to 4496	361	5761 to 5776	441	7041 to 7056	521	8321 to 8336	602	9617 to 9632
122	1937 to 1952	202	3217 to 3232	282	4497 to 4512	362	5777 to 5792	442	7057 to 7072	522	8337 to 8352	603	9633 to 9648
123	1953 to 1968	203	3233 to 3248	283	4513 to 4528	363	5793 to 5808	443	7073 to 7088	523	8353 to 8368	604	9649 to 9664
124	1969 to 1984	204	3249 to 3264	284	4529 to 4544	364	5809 to 5824	444	7089 to 7104	524	8369 to 8384	605	9665 to 9680
125	1985 to 2000	205	3265 to 3280	285	4545 to 4560	365	5825 to 5840	445	7105 to 7120	525	8385 to 8400	606	9681 to 9696
126	2001 to 2016	206	3281 to 3296	286	4561 to 4576	366	5841 to 5856	446	7121 to 7136	526	8401 to 8416	607	9697 to 9712
127	2017 to 2032	207	3297 to 3312	287	4577 to 4592	367	5857 to 5872	447	7137 to 7152	527	8417 to 8432	608	9713 to 9728
128	2033 to 2048	208	3313 to 3328	288	4593 to 4608	368	5873 to 5888	448	7153 to 7168	528	8433 to 8448	609	9729 to 9744
129	2049 to 2064	209	3329 to 3344	289	4609 to 4624	369	5889 to 5904	449	7169 to 7184	529	8449 to 8464	610	9745 to 9760
130	2065 to 2080	210	3345 to 3360	290	4625 to 4640	370	5905 to 5920	450	7185 to 7200	530	8465 to 8480	611	9761 to 9776</

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